Vol. 5, No. 1 February, 1954

SYSTEMS AND PROCEDURES QUARTERLY

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PUBLISHED BY THE SYSTEMS AND PROCEDURES ASSOCIATION OF AMERICA

Quarterly

Official Journal of the

Systems and Procedures Association of America

February 1954

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The Quarterly is published by the Systems and Procedures Association of America, 330 W. 42nd St., New York 36. Yearly subscription rate $3.75, single copies $1.

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A Coast Conference Paper

Mechanization—

Its Practical Considerations

COST REDUCTION cannot be the only objective where mechanized accounting is being contemplated. The scope and value of managerial reports must be maintained.

by Ervan M. Robbins

MECHANIZATION is one segment of the mechanics of accounting. The mechanics of accounting is one segment of systems work. It may be well to take a look at systems work, to see what the objectives are, and the steps that must be taken to achieve those objectives.

Some of the terms used by engineers in describing the objectives of engineering can be used appropriately to describe the major objectives of systems work. Those terms are: product improvement and cost reduction.

There are, of course, lesser objectives and fringe benefits of many kinds but those two are broadly the major objectives of systems work. To the engineer, product improvement means a better product, one that does the job better, lasts longer and requires fewer repairs. To the accountant, product improvement means a better product and the only product the accountant has is the reports he delivers to the executives of his company. Like the engineer's product, the accountant's product always can be improved.

Cost reduction means the same, both to the engineer and to the accountant, but it should be noted that the accountant sells his product at cost.

Three Steps in Systems Work

In systems work, the two main objectives are achieved by methods that can be classified very broadly in three steps:

1. *Survey.*
2. *Design of reports or method of displaying data.*
3. *Design of the mechanics.*

The survey is a study and analysis of a business unit and of the position of that unit in its industry. The objective of that study is to furnish management with the knowledge of the results of its operations that is needed to run the business. Obviously, the management needs to know sales and cost and expenses, but it also needs some guide to indicate when the figures are getting out of gear. The comparisons are many. They may be budgets and standards; they may be comparisons with data published by a trade association or they may be comparisons with statistics compiled by government agencies or economic services.

The second step in systems work is designing reports that display the information needed to manage a business in the manner and in language that executives can understand. That is the accountant's product; it is the only thing the management sees and uses, and it is the principal basis on which the management will judge the accountant.

The third step in systems work is that of mechanics. By mechanics is meant the design of original and intermediate documents, the procedures for recording, summarizing and journalizing. It is obvious that mechanics will include the entire field of manual gadgets, such as strip accounting, alignment boards, peg boards, notched

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cards and many others; it will include mechanical aids to manual accounting such as duplicators, addressograph machines, adding machines and calculators, and it will include completely mechanical accounting devices such as bookkeeping machines, tabulating equipment and electronic brains.

It is the first and third steps in systems work that are usually in conflict. Decisions are made that certain management control data is needed, but the mechanics of getting that data may be expensive. Before mechanics can be considered, we need to know what control data is to be furnished and the volume, variety and nature of source entries.

The Accountant's Worth

If the objective of mechanization is cost reduction, the objective is, of course, worthy, but no accountant who hopes to be considered a valuable aid to management just because he installed a bookkeeping machine and reduced the accounting staff one or two clerks should ever forget that he may be disappointed if he is not providing all of the information the management wants to run the business.

The first objective of mechanization should be to broaden the scope and value of the managerial reports that are currently being prepared. Real managerial reports are control reports that tell the management which way the business is headed; that tell who is spending how much for what, and whether the company is getting its money's worth for the materials used or sold, for the payroll dollars paid out and for the expenses incurred. The company should be studied both internally and in its relation to the industry of which it is a part, to determine the factors that influence profit. Each executive of the company should be studied until the accountant understands his processes of reasoning, his approach to the problems and his management techniques. Reports should be designed to fit the peculiarities of personality of the executives he is trying to serve. Furnishing management with the understandable and usable control reports needed to run the business is the most important way in which the accountant can be of some good to management.

Good Manual Methods May be Cheaper

It is a common experience to find that good manual methods are cheaper than mechanical methods. An actual case will illustrate the point.

> In a medium sized manufacturing company, the accounts receivable ledgers were machine posted by one girl who did nothing else. It was found that the largest percentage of invoices were issued to approximately 60 distributors, the remainder being to government agencies and to associations and the like. Practically all of those customers sent in one check a month for the total of the previous month's invoices, and adjustments to the invoices were infrequent. A manual unit accounts receivable procedure eliminated all the posting. The whole procedure became a part time duty of another employee who had some spare time.

Changing from bad manual methods to bad machine methods will solve nothing. Changing from bad manual methods to good machine methods may solve the problem, but may be expensive unless significant cost reduction is achieved. The first thing to consider is whether a change to good manual methods would solve your problem and whether good manual methods would be cheaper than mechanized procedures. It may be necessary to make a thorough survey to evaluate all factors. Changing from bad manual methods to good manual methods can be illustrated in another actual case.

> In a lumber mill, the method of obtaining a labor distribution was clumsy and time consuming. It consisted of departmental time reports and required that every item for every man be extended. Then every item had to be hand summarized. A weekly peg strip for each man was substituted. It served both as a source for the pay check and for labor distribution. The hours on each peg strip were cross added and footed. The strips for each department were cross added, footed and reconciled. The only extensions were the total hours for each man at payroll rate and at standard departmental rate, and the total hours on each operation in the department at standard departmental rate. The whole operation was quick, easy and accurate.

Combining Manual and Mechanical

One point that calls for careful consideration is the extent of mechanization. A careful study of all factors will sometimes indicate that a combination of manual and mechanical methods may provide the information quicker than if all of the procedures were concentrated on the mechanical equipment. The following actual case will illustrate.

> In a flour mill, bookkeeping machines were installed for conventional accounts receivable procedures. Sales distribution for spot sales was not made a part of this operation because of the high speed with which a complete hedge report had to be assembled so that the long or short position could be equalized immediately when the grain markets opened on the following morning. Unit tickets were prepared on the bookkeeping machine, and were entered on two designs of peg strips covering about 170 products. These peg strips were used in conjunction with peg strips prepared in other departments for flour orders, for grain sales and purchases and the other items that enter into a

long and short report. The position could be determined and a complete report could be assembled before nine o'clock each morning.

In other cases it may be cheaper in the overall operation to do a part of the work manually.

In a manufacturing company, voucher checks were prepared in considerable volume on busy tabulating equipment. Checks that had to be written while somebody waited, such as expense checks, travel advances, freight bills and similar items were written on an inexpensive alignment board. Tabulating cards were punched from the register sheet at the end of the day. Costly interruptions of long runs on busy tabulating equipment were avoided.

Mechanical Methods Must be Right

It is important in weighing the advantages and benefits of a machine installation that you know exactly what you are going to do mechanically and how you are going to do it. Poor mechanical methods will mean a clumsy operation, a high cost operation and delay in getting information. Delay in assembling information is illustrated in this actual case.

A manufacturer of internal combustion engines was tabulating his requirements of parts and subassemblies for production schedules. Many parts had very long lead times making it necessary to project the schedule eight months into the future. This involved 85,000 piece parts. It required 800,000 tabulating cards per month. Orders were cut off on the first of the month and cards were punched, reproduced, sorted, multiplied and tabulated. There were extreme peak loads successively in the tabulating department, in the production control department and in the purchasing department. The purchasing department actually began action with vendors five weeks after the cutoff date. A change was made in the method of tabulating that cut the card volume from 800,000 to 215,000 cards per month. Another change was made so that instead of cutting off the orders for all 22 models on the first of the month, three models were cut off on Monday and three models were cut off on Wednesday, and so on through the month. The peak loads disappeared and work flowed evenly throughout the month. Vendor action time was reduced from five weeks to four days.

High costs because of bad mechanical methods are illustrated in the case of a candy manufacturer.

Payrolls for approximately 4,000 employees were being prepared on tabulating equipment that was overloaded. The costs were process type and no labor distribution was required other than departmental totals. Hours were posted to individual earnings record cards and extended; deductions were entered and net pay was calculated. From those individual earnings records, a single card was punched to produce the paycheck and payroll journal. From a practical standpoint, the tabulating equipment was being used as an automatic typewriter. The payrolls were put on payroll machines at a saving of approximately $15,000 per year.

Use Full Potential of Equipment

It would be foolish to hire a clerical employee and let that employee sit around half of the day doing nothing. Yet that is exactly what happens in many machine installations, both bookkeeping and tabulating. In planning an installation, it is better to plan too much work than too little, and to plan for a skilled operator who has nothing else to do but get the most out of the machine. As the installation proceeds, any under or over estimating of machine production can be adjusted to a practical level.

The fullest practical utilization of a machine installation can be illustrated by another actual case.

In a group of flour milling companies having mills, warehouses and branches in Montana, Washington, Oregon and California, tabulating equipment at the main office was used largely for sales analysis. The sales analyses were mailed back to various mills for use by local sales executives and for journalizing and entry in their general ledgers. Approximately sixty people were performing accounting duties in the several locations. The accounting for all companies and locations was centralized and general ledgers were kept on punched cards at the main office. Balance sheets for the operating companies and profit and loss statements for thirty odd locations were prepared and consolidated on the tabulating equipment. The full potential of the equipment was utilized at substantial savings.

Variety Instead of Volume?

From a cost viewpoint, it is commonly but erroneously assumed that a company must be a certain size before any mechanization is warranted. The fallacy of that thinking can be demonstrated with very simple arithmetic. Generally, a capital investment is considered profitable if the savings will pay the investment back in two years. An all purpose bookkeeping machine will cost $5,000 to $6,000. Divide that by 24 months and the necessary saving to pay for the machine is around $250 per month. A reduction of one clerk will make the investment reasonable. The reduction of one clerk has little to do with the size of the company, except that in the smaller companies, the reduction usually must be achieved by putting a variety of work on the machine rather than a volume of one or two procedures.

(*Continued on Page 25*)

A Fifth Systems Meeting Paper

Gaining Good

Inventory Management

by M. M. R. Blake

THE prime objective of inventory management is to evolve a method whereby the system chases the man with measurable units of work on a daily assignment basis rather than have the man chasing the system, which through man's inefficiencies, proves ineffective.

We must approach the problem with an analytical mind and through the eyes of top management in order to provide the answer to their problems. Of necessity a yardstick or standard is used as a management tool to deal with diminishing net returns, minority factors, and to permit management to take immediate corrective measures to reduce possible losses to a minimum. One might mention the old axiom, "your first loss is your best loss," and let any such weaknesses be known at once.

Our first step will be to examine the company financial statements for a period of several years in order to establish a business trend for the company. The next step is to conduct an activity analysis of major asset items reported on the balance sheet which more than likely will reveal that inventories are the largest single item shown. A productivity analysis in the manufacturing operation, along with materials, work in process, also have a direct or major effect on inventories.

Figures released by Dun and Bradstreet, covering the total business failures in United States, during the second half of 1949, reveal that inventory difficulties accounted for 13.4% of all failure, in spite of a booming economy and a seller's market in many lines.

The year 1950 produced another booming picture. With government stockpiling of certain basic raw materials, industry joined the mad scramble trying to protect itself for peacetime production of consumer goods, totally disregarding the limitations of stock budgets, required turnover ratios and market potential. Improper planning created sharp increases in dollar values, in raw material inventory and in consumer goods inventory—all at a great risk to the nation as a whole.

The first six months of 1951 produced a varied and changing picture with many major industries caught with large inventories of finished consumer goods. If we hold the goods our companies could suffer severe losses, and in the end have to sell anyway. If we dump it on the market, some of us get out from our responsibility but for others it could mean ruin and the beginning of the downward spiral of a depression.

According to the U. S. Department of Commerce $67.9 billion were invested in business inventories, and $41.9 billion in factory inventories, in the United States during the month of July 1952. The U. S. national production is about $340 billion per year. Let us assume that sales are equal to production as a case in point. Our turnover picture would be a little better than 3 turns nationally, which is nothing to be proud of. True we make a profit, but we could make more on less inventory investment. Seventy percent of the business failures in one of the periods of 1952 were due to excessive or mismanaged inventories.

Most large companies have some internal control that makes such situations known with a minimum of delay, and by allowing some corrective measures, reduces pos-

FAULTY inventory control can bring a prosperous company to its knees in no time. Intelligent inventory management can promise large economies—contribute to sound market planning and merchandising operations.

sible loss. On the other hand, businesses having inadequate or antiquated controls, or, as in the case of some small businesses with no inventory controls, often do not know of their plight until the preparation of some periodic statement— monthly, quarterly, or even annually. But what is the good of facts that come too late?

I know of one major company in the United States that, by using the principles of inventory management, has now achieved 10% more sales with only 67% of its former inventory—amounting to savings of many thousands of dollars.

Any number of stock control systems and housing can do a good job if the only requirement is a chronological In and Out record. But this problem goes much deeper. We do need an In and Out record, of course, if the dollar value of the commodity concerned warrants it. What we do with this record is the gist of the matter. So let us elevate the term *Stock Control* to *Inventory Management* or *Managed Inventories*, because it must sound important and provide the tools for intelligent management to do a job.

Inventory management takes over where stock control, as we know it, ends. If we are to appreciate this fact, we must be willing to do some thinking and approach the subject from a much broader aspect. Inventory management must provide the one best way for obtaining these standard and variable merchandising factors in order to achieve intelligent market planning and sound merchandising operations.

Inventory management stresses the fact that the control of inventories is distinctly a problem for management. Very often this subject is confined to posting stock cards and keeping the physical stock in balance with these cards. While these are important considerations, they hardly begin to define inventory management.

In any discussion of inventory management, the standard or key word is "turnover." Broadly speaking, turnover is the constant changing of goods into cash and cash into goods. The most desirable rate of turnover is that which gives a maximum gross profit, and in turn requires a constant control over three factors:

1. *Cost of Acquisition* (ordering, expediting, etc., the general purchasing functions)
2. *Cost of Possession* (capital tied up, interest charges handling and storage, etc.)
3. *Gross Profit Margin* (resulting from 1 & 2)

An unbalanced or excessive inventory will quickly eat into profits. If turnover is so rapid that an item is being ordered at close intervals, we are greatly increasing our cost of acquiring the stock. Each time stock is ordered, we have to go through the routine of purchasing, expediting, receiving, etc. and this cost must be paid for out of the profits from the sale of such goods. In addition, if the amount of stock carried is so small that frequent reordering is necessary, we are possibly losing a lot of business during periods when we are out of stock. Since a profit is earned only on a stock which moves off our shelves, any items which are overstocked or slow moving are a source of loss. They represent a tie-up of capital, and the cost of carrying them steadily mounts.

We lost on the following counts:

— interest on the money invested in the stock
— handling costs
— extra space and facility requirements
— insurance
— obsolescence, administrative costs, etc.

These carrying costs have been known to range from 15% to 20% of the annual inventory value. Accordingly, it is possible to say that inventory eats up over 1% of its value monthly. This alone is a potent argument for a streamlined plan of inventory management.

The bar chart shown in Figure 1 represents the effect of turnover on commodities sold in the USA during 1949.

The rate of turnover of a stock item is simply the ratio of its average inventory to net sales for the period. By average inventory is meant the average closing inventory for a given period, *e. g. the* physical inventory of January, February and March might be 50, 60 and 40 units respectively. This would give an average inventory of 50

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EFFECT OF TURNOVER ON PROFIT

Too SLOW turnover increases cost of possession.
Too FAST turnover increases cost of acquisition.

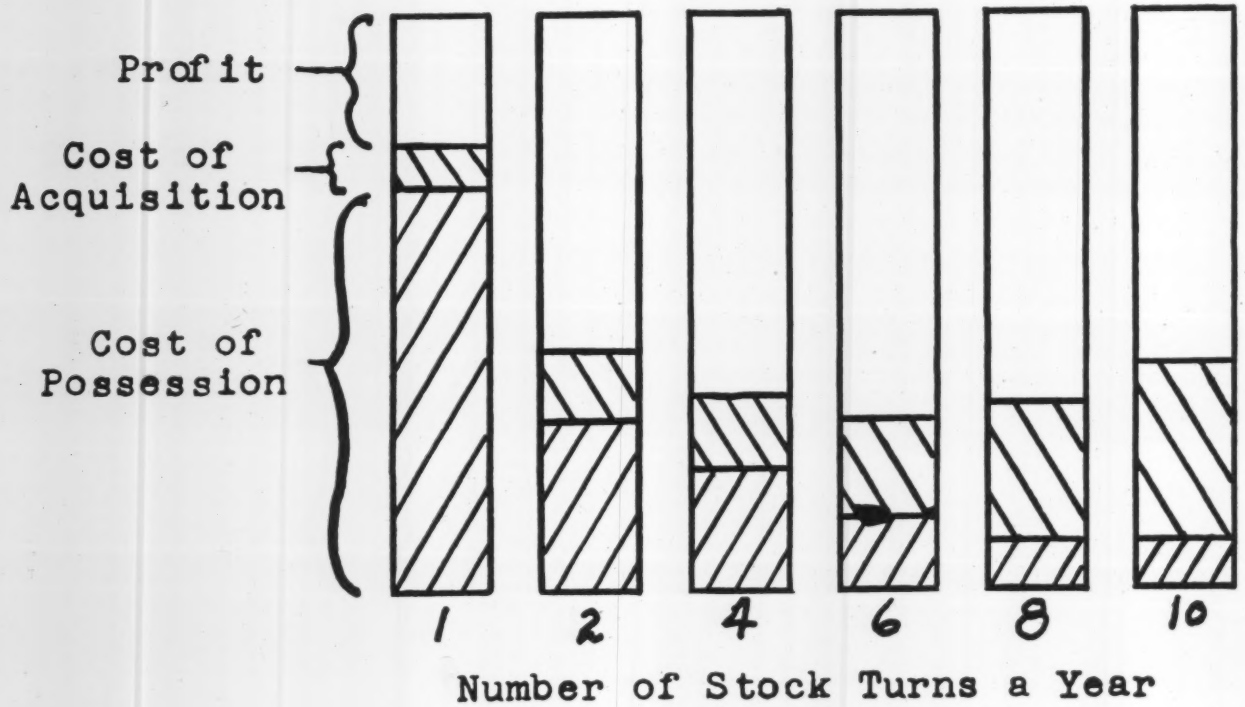

Figure 1

units for the quarter. On net sales of 300 units for the quarter, this represents 6 turnovers during the period—or 24 turnovers yearly.

From the turnover chart illustrated in Figure 2, we can compute the rate of turnover as follows:

Average Stock for 3 months	50 units
Total unit sales for 3 months (net)	300 units
Therefore, rate of turnover (3 months)	6 turnovers
or rate of turnover in 1 year	24 turnovers

This plan has no safety factor and thus creates an out-of-stock condition at frequent intervals. This in turn causes the cost of acquisition to be very high.

Figure 3 shows an actual turnover rate of 12 times in a year. It is based on a plan which requires a minimum or *safety stock* of 50 units—to cover the period between the placing of a new stock order and the receipt of the goods or material. This guards against losing sales by being out of stock and reduces the number of turnovers, thus decreasing cost of acquisition.

The principle here is that the average inventory is equal to average net sales for a given period—in this case the average inventory of 100 units is equal to the average net sales of 100 units.

A plan of inventory management, to be effective and ensure proper control, must be built around the following questions:

What items are properly warehouse items?
How many units are going to be sold?
How long is it going to take to get a supply?
When should a new order be placed?
How many units should be ordered?

Our only reason for carrying merchandise in stock is to serve a future demand. It is very dangerous to assume that the sales during the past 60 or 90 days are an adequate guide to future requirements. They are a guide, of course, but stock ordering should always be based on the estimated demand for the months ahead. This requires very close cooperation with the sales divisions and the commercial departments to ensure that stock will always be proportionate to demand.

Two very important phases of this plan must be con-

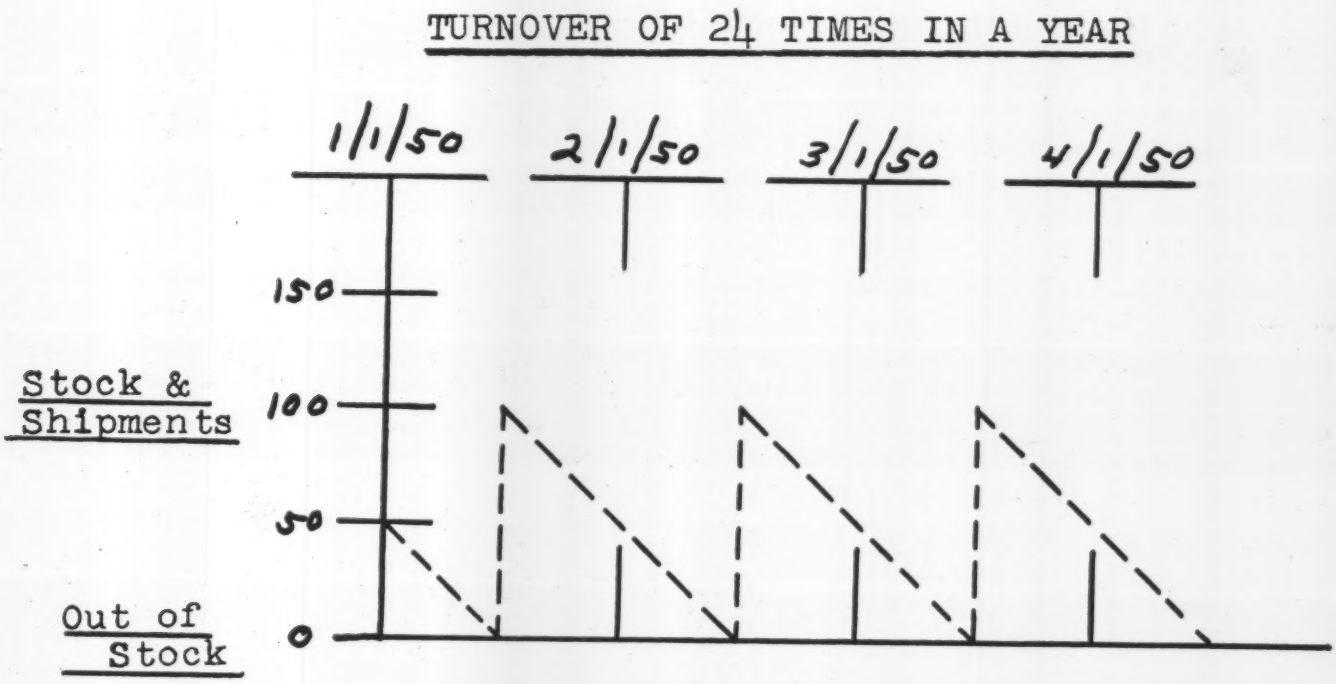

Figure 2

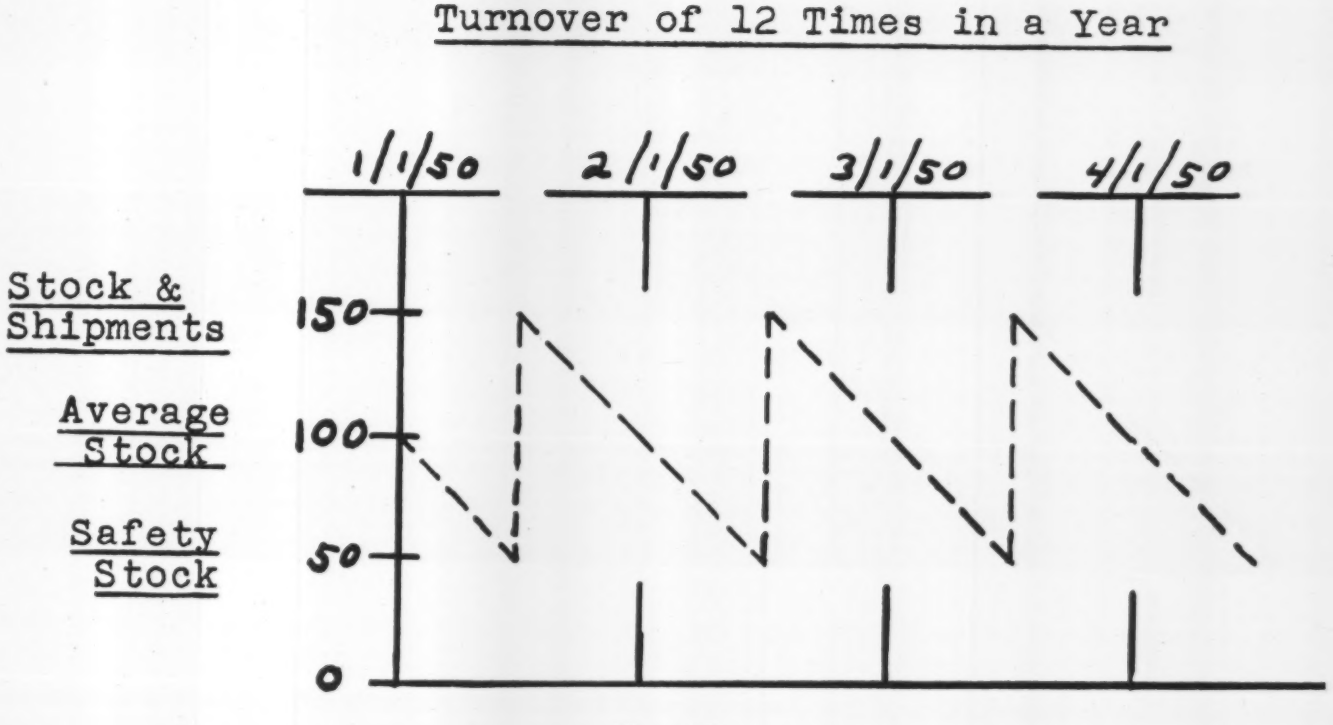

Figure 3

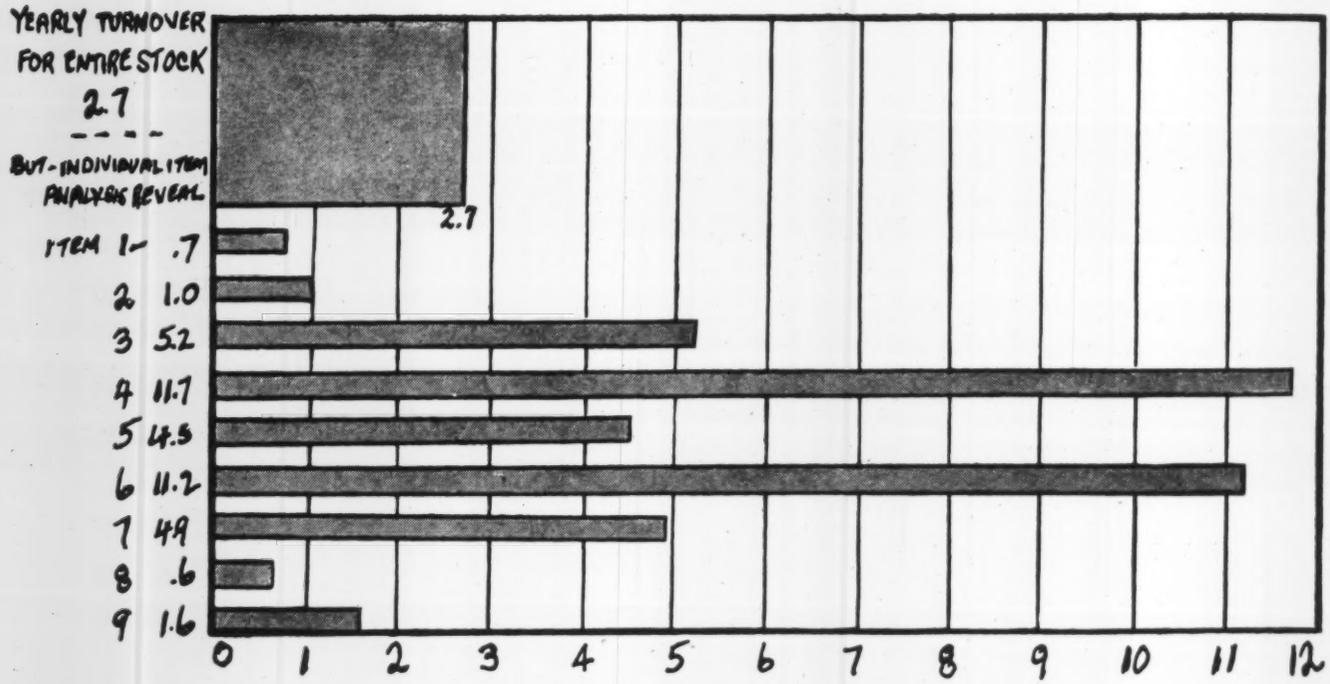

Figure 4

stantly kept in mind when studying this new method, viz:

1. Each item of stock is to be considered by itself in establishing the average number of days' stock to be maintained for that item. The present practice is to be guided by the overall average number of days' stock for all commodities.

2. This plan is built around the concept of "number of days' sales"—which means the estimated future sales, expressed on a "per day" basis. Seven control elements are introduced and the concept of "number of days' sales" is a function of each of these elements.

It is by no means sufficient to accept the rate of sales, for the past 60 or 90 days (or for any other period) as a basis for estimating sales for the next 60 or 90 days. Considerably more information is needed. The plans of the commercial departments must be known, as well as the competitive picture, and the general sales outlook. If market data, standard and variable, are carefully gathered and evaluated, and if proper liaison exists between the inventory group and the sales group, past sales volume can be very helpful in estimating future sales, but only after allowing for transfers from stock, returns to stock, sales of excess stock through special activities, one time sales or non-recurring sales, etc. These factors all have a direct effect on future estimated sales.

In Figure 4 we see how an individual or unit product analysis reveals unbalanced stocks. The average yearly turnover of 2.7 for the entire stock, while appearing to be good, could be hiding a poor inventory performance. Unit product analysis in this case reveals that items 1, 2 and 8 are making one turn or less yearly (as shown on the bar chart). The cost of possession will be high and therefore profits are reduced. The performance of items 3, 5 and 7 are satisfactory, but items 4 and 6 are turning over nearly 12 times a year. The cost of possession is small in this case but the cost of acquisition is high. Here one is achieving increased dollar sales but diminishing net profit.

This proposed plan of inventory management stresses two points:

1) The use of a constant measurable Unit of Work;
2) A method that insures having day's work done that day.

This is a method which will enable us to organize a function and jobs in terms of a constant, measurable unit of work, and thus operate with a minimum staff. Otherwise the variables and inconsistencies in the method will result in peaks and valleys in the work load which means we must spend more dollars on a function because of maximum staff. And often stand-by equipment is necessary. Moreover, the "unit of work" approach enables us to define each person's responsibility and adjust changing work loads as the need becomes apparent.

If high-volume operations are to be efficient, work loads must be kept on a current day basis. The plan chases the man. He's got to do his work currently because his job assignment and his productivity are both measured against a common yardstick.

Inventory management gives us the following benefits:

1) Enables us to develop and handle increased

(*Turn to Page 26*)

MEMORANDUM

TO: Comptroller **DATE: December, 1953**

FROM: Tabulating Department Manager

SUBJECT: Control Panel Fixtures for #407 Tabulating Machine

ATTACHED is a requisition for twelve Control Panel Fixtures for our three No. 407 IBM Tabulating Machines. These panels are necessary for the following reasons;

1. A 100% increase in tabulating machine loads over 1952 loads.
2. The character and variety of work has changed considerably in the past year.
3. Contemplated records and reports to be prepared by tabulating machines necessitate additional equipment. (We have already committed ourselves to mechanize 12 new projects in the forthcoming months.)
4. We have utilized our reserve panels on other projects and now find it necessary to replenish our reserves.

Normal delivery for control panel fixtures is four months. In view of the delivery schedule, it is suggested that these panels be ordered as soon as possible.

AT PRESENT, after all practicable consolidations, we have available exactly *one* 407 fixture for *all* special requests, tests, new work, and non-scheduled reports. We have no reserves at all, and without fixtures, we will shortly be at a dead stop on the work required.

In recognition of the fact that our current request must be processed by various people fortunate enough to have little familiarity with these fixtures, we are herewith submitting information that may be helpful in clarifying our situation to these people.

In general, control panel fixtures are the tooling involved in the process of mechanizing the paper work of this organization, and most of their mystery evaporates when they are considered as *tooling*.

1. Purpose of Control Panel Fixtures:

Like any other tooling, the purpose of a control panel fixture is to guide a machine through predetermined operations to produce a specific job.

2. Description:

In appearance, one of these fixtures resembles an oversized punch-board, of standard construction, set in a rigid frame for rapid positioning against the 5,120 switch contacts of an I.B.M. 407 machine, which is the machine that prints records and reports.

3. Set up of Fixtures:

Common set-ups require that over 4,000 of these contacts be wired to impulse several hundred relays operating on a dozen different timing cycles, so that correct results print in 120 type positions at the rate of 150 horizontal lines per minute.

Obviously, this is not a fifteen minute job, though the contacts are grouped by function to make it easier than it sounds. The time and skill are such that unless records and reports are highly standardized, one report requires one fixture, permanently set up.

In practice, setting up the fixture is the means by which

the specifications of the job are fixed, and it involves design and layout of the set up as well as plugging several thousand holes. It is also necessary to test it with a complete operational check-out on the machine with which it is to be used.

This setting-up process can vary in difficulty and length of time. Some set-ups can be made by any machine operator, and others require the highest skill in the department. Time can vary from a couple of hours to a week. Normally, most new set-ups can be made and checked out in about one day. However, if it is a revision of an existing set-up that has already been adapted to multiple uses, all the angles of the old use have to be traced and provided for, and it is more likely to take a week than a day.

4. Function:

As in shop work, once a job is set up with tested fixtures, ordinary Machine Operators can turn out work of satisfactory quality and quantity.

Without adequate fixtures, economic utilization of tabulating machines is not possible.

5. Reserves, Procurement, and Procedure:

Prior to the operational phase, while work is being mechanized and routines are being developed and installed, it is necessary that there be a reserve of fixtures on hand. This is to set up the new records and reports and routines while fixtures are being ordered, on a four month lead time, against specific record and report and routine requirements.

For example: this tabulating function has been in installation phase for two and one-half years, and is producing 150 regularly scheduled records and reports from 75 fixtures. Some have even shaken down through two revision stages into what may be final operating phase. The point is that these requirements shaped up a few at a time, and ordering on four month delivery would have strung the present position out beyond ten years.

There are three main reasons why fixtures must be on hand prior to the point at which report requirements are stabilized:

A. The cheapest way to work out a smooth operation is on an experimental basis. Bugs can be ironed out, alternate routines can be calculated and tested, samples can be presented for revision and eventual approval and people can be trained before being swamped with the volume of the job itself.

B. Once the Comptroller and other Department Heads reach agreement on what is wanted, they want it now. The matter would not have reached discussion if it were not vital, and there is not time to wait four months for fixtures to be delivered.

C. A complete set of fixtures, tested and approved in the development stage, automatically implements about 80% of the procedure that otherwise would have to be learned, written and enforced.

Reason (C) is especially applicable in this particular tabulating function, because it has a very large variety of work, run in small lots on a daily and weekly schedule. Average time on a task and machine is under one hour, so that complete fixturing from the start has a very great effect on getting a procedure into effective operation and on subsequent effective utilization of machines and manpower.

Of the fixtures specified in our request, one-half are essentially such a reserve, to be replenished by specific orders against specific requirements as these become stabilized. We hope to maintain this reserve at a normal safe limit of 10% of fixtures on hand, which is a slim margin, even after the installation phase of our machine work settles down into repetitive production of stabilized jobs.

Besides the need for running alternate procedures during revisions, there is always the probability of being called on to take over some new system as a result of change in management thinking, and delay can be exceedingly expensive.

6. Tear-down of Fixtures:

We can tear down fixtures already set up, but only at a cost from $20 to $50 per issue of a report, due to the skilled operator time lost in re-wiring the fixture and rechecking it. There is also the risk of error, the loss of machine time, and the loss of other work that the operator would be doing. We do not have the man power to make this a practice, and economically, it is not justifiable.

7. Requirements in Format of Records and Reports:

It is becoming fairly clear that, sooner or later, we should undertake a program of standardization of records and reports. Practically all of our newer work requires use of our three 407 machines, for which we have only fourteen fixtures apiece. Original ordering did not anticipate the extent to which use of this equipment would be mandatory for production control and performance records and other finished reports, so that our basic standards are considerably different from those that applied a year ago at the time of last ordering.

We are finding it necessary to set up description cards for one tabulator or the other, due to report spacing and the requirements of symbol printing, as in the case of production control and other action records, where misprinting of symbols can cause mis-ordering of parts and resultant confusion in plant schedules. Nor has it been

(Continued on Page 26)

Management Wants

Simple Patterns

"A manager wants his systems simple so he can understand them; so he can personally give them to his organization, and find ready acceptance. . . ."

by William B. Worthington

WHAT management wants from us is help in achieving good systems and in keeping them good. The way management wants them is in the form of patterns of procedure simple enough for anybody to understand. They must be simple, because they have to fit into the overall pattern of the business; which in turn must be fitted into the overall patterns of industry, government, communities, markets, people, and facilities.

It seems obvious that complication at any level can result in fantastic complexities of the whole business, to the extent that red tape can defeat the purpose of the enterprise.

Simplicity of pattern is largely a matter of presentation, and one of the common denominators of our work is that regardless of the problem or solution, it has to enter the perception of one man at a time.

For presentations to management, I submit a simple formula: boil your presentation down to about three short paragraphs, totaling less than one page. The first paragraph can cover the biggest single governing factor involved. It can be the shortest paragraph, and you can depend upon it getting about 60% of the attention bestowed upon the whole.

The second paragraph should cover the next biggest single factor—perhaps a few more words, but in any case, it will get about 30% of the attention to the whole.

The third paragraph can be the largest and can cover all other considerations, if any; and it's no place to put anything for much more than the record, because it will probably rate about 10% of attention to the whole.

Consider these simple and obvious points as the basis for the above reasoning:

1. Decision is based upon opinion; if the first statement doesn't tap existing knowledge and emotion, your man is already half departed before he gets to the second line.

2. Your job is to get the matter into 1-2-3 focus. You do it, too: most of us can look back on successful jobs, and outline, offhand, why it was done and worked. If we can do it after the fact, we'll get further by going through the brain-pounding operation of doing it *before* we try to sell it.

3. We live in a verbal society. We can set up a deal with visual presentations to make sure the frame of reference is understood. All along the line, we can use all kinds of means to educate the people involved. Somewhere, though, we're bound to need the one-two punch lines to get across: we can use them later as installation slogans; and the boss can use them handily in justifying the same action to *his* superior. As a matter of fact, that's one of the main things he's usually looking for—a solution that *he* can sell to one and all, top and bottom!

Words themselves are worth extra study and critical inspection. They mean different things to different people. It's perfectly possible to know a subject thoroughly and not be able to state it without a lot of hard work, both in organizing the subject and in selecting the words to use in describing it.

There exist some simple gimmicks for testing and for aiming our words. One is to try them out on our wives or

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secretaries. The normal attitude of our ladies is a working model of the point of view of top management, and if they can't understand our presentations, the vice presidents rarely have a chance. We should write so that even the president of the company can understand us.

The president can be expected to have the least technical knowledge of the subject, and the most knowledge of what he himself wants. Listen to him, then use his words the way he uses them. He's your best model because anyone under him has already made it their business to understand his language.

Mark Twain stated that the right word versus the almost-right word is like "Lightning" and "Lightning Bug." Use one word if it exists, but though brevity is good, clarity is better: if a word is foggy, use a definitive phrase, or break it into three words that tap the start, middle, and end of the idea.

Words and Their Meaning

For instance, our word CONTROL. In some cases it will mean more if we say "guide according to plan"; in others, "inspect, evaluate, and re-direct." To an accountant, use "record, measure, and report," and to an electronics engineer, you'll probably make it clearer as "feedback into a closed system."

In any case, avoid two-word groups such as "REVIEW AND APPROVE." "REVIEW," by itself, has meaning, and "APPROVE" is such a common synonym for signature that no harm is done by its use. But what you generally mean by both together is something like "signify acceptance," "certify conformance to company policy," "validate as an authorization to do work," or just plain "sign it and shut up."

Your aim is accuracy, unmistakable meaning, and a sequence of thought that matches the point of view of your man. Give him justification for using company time to read; and tie his interests in early, so he'll have a motive to make an effort to comprehend. Beyond that, the closer your words latch into his experience, the more vivid will be the images they evoke, and the simpler will be the appearance of the pattern you are presenting.

Why does managment want systems? An old example can be useful. The skipper of a ship must be able to direct its course, so he does it through a mechanical system wherein turning a wheel moves a rudder and steers the ship.

He also maintains a system of navigation, a system of assigning duties to men, and many others. The multiplicity of actions in a ship is staggering, and likewise, in business. The skipper's job is to keep himself clear of routine, and alert to act according to the variables of the situation: the weather, the enemy, or whatever comes. He accomplishes this by consigning repetitive routine to systems that normally progress through three broad, general types:

a. Conscious procedures, super-imposed on the habit patterns. And traditionally, progressing from conscious form to habits, and frequently from there to mechanization.
b. Habits, impressed into people by much drill and usage, till performance of a duty is second nature —faster, more accurate, and far more dependable than any thinking action could possibly be.
c. Mechanical—steering, hoisting, propulsion and others. The last two hundred years have brought a startling acceleration into this type.

The result is that the ship operates, and the skipper is relatively free to use the ship to carry out the objectives of his mission. A business manager wants the same freedom from routine, for essentially the same reasons. He gets it in the same way—by systematizing routine, and keeping his own head clear to deal with the variables of his situation. His objectives are usually more standardized than the ship skipper's. A pattern, as follows, fits many businesses:

a. Make a profit.
b. Keep ahead of competition.
c. Survival—of the organization.

A manager wants his systems simple so he can understand them; so he can personally give them to his organization, and find ready acceptance; so that their immediate adoption and profitable use will enhance his own standing with his people, his bosses, and himself.

The three deepest desires of our times seem to center around each individual's need to be accepted, to be significant, and to be secure. Business management is certainly no exception to these generalizations, and a simple solution to a simple problem, publicly simplified by himself, helps the man where it counts—in his own feelings. Obviously, a longer range basis exists than this. But just as obviously, current public approval counts more heavily with a business manager than it does with a long range planner.

Misdirected Interest

This is understandable. Most of us are only too familiar with the manager who spends 60% of his attention on his associates and superiors, 30% on the routine of his job, and 10%, maybe, on development, improvement, and future planning.

This has some obvious implications to us, in systems and procedures work: (1) If a plan is going to catch and use that 10% of attention, it's got to be good and it's got to be simple. (2) Long range planning is likely to be inhibited in favor of expediency. (3) Our man is likely to be receptive to any simple proposition that he can use —literally, he doesn't have the time for dreaming up his own.

Time to think, perspective, and neutrality are three prime tools that almost anyone of fair intelligence can

contribute immediately to help our manager help himself.

Some of the questions that we can ask ourselves to establish a point of departure, are:

What does our manager say his problem is? What does he feel it is? And what is it?

Where do we have to arrive at, to solve it?

Where are we, and how do we go from here to there? What stages do we have to go through, what do we have to do now, and how should we schedule successive stages to arrive at the final answer?

Specialized knowledge of systems and procedures can be exceedingly useful in arriving at simple solutions—provided it is tempered with full humility and complete realization that what worked elsewhere probably doesn't apply here because this is a different situation. Knowledge of management's job, and particularly of the no man's land between levels and between departments, can be more helpful. The principal characteristic of the area between functions is that the people on both sides are usually talking about the same things, in different languages, heavily slanted toward their own interests.

Management's job is a prime interest of a Manager, and the more you know of it, the better your chance of helping him. Essentially he must:

1. Delegate his authorities and functions so that he uses the best abilities of his people to get his job done.
2. Keep driving for improvements on the best possible methods and processes.
3. Maintain operating systems that best employ the methods and facilities of his operation.
4. Set up administrative systems that work, for him. Use them to keep himself and his boss informed of the current score.
5. Continually organize his people, space, and equipment to support the way he operates, because changing conditions continually require new patterns.
6. Take care of his subordinates, so they'll take care of him.
7. Keep his policies, principles, and rules published up to date, so he and his people can avoid repetitive solving of the same old day-after-day problems.

Anything on these subjects is bound to be of interest to your manager, and what's more, you'll find that some or all of these principles are the corner posts of any system you propose.

I consider the all-time classic in problem simplification to be one that appeared in the Navy. For years, ships have been built with bulkheads for water-tight compartmentation, and doors from one compartment to another. The hitch has been making sure the doors are closed when they should be, and some nasty incidents occurred during this last war. It gets hot below, the doors come open, and when trouble happens, *swoosh!* she fills from end to end, and scratch one warship, complete with full complement of men. However:

Take a look at a new carrier. No doors. Built up-and-over; meaning, to go from one compartment to another, you climb eight ladders up, past eight decks, and come back eight ladders down. Something like going to the top of an eight story building and back down again to get from one room to another.

Simple Solution

But look at the beautiful simplicity of the solution! (1) No doors, no problem. (2) Certainty of water-tightness. (3) Simpler to build, and easier on the taxpayers.

Clarification of organization is a major management method of simplification. If our manager can say, "Problem in Sales? That belongs to Jones, See him!" half our troubles are over. After that, the deck is clear to go to work on Jones. As a principle of management, a clean line of command, clear down to the door, has no substitute. A man cannot serve two masters. As a consideration in developing a simple pattern of action, the question "Who's responsible?" comes second only to "What's the objective?"

I don't think I'm exaggerating when I state that about 80% of the problems I've been in have been fully or substantially solved when responsibility was unscrambled.

The key question is "What does this function owe to other functions?" rather than, "What does this function do?" The productive organization may "make slingshots," but if its duty is stated "Supply Sales with slingshots as specified by the Marketing Forecast," its duty is clear. What's more, this taps directly into prime management interests, and is simple enough for anybody to understand. If Manufacturing supplies the slingshots as scheduled, it has done its job. If it doesn't, the fur can start to fly.

Stick to describing services between departments. These are the crossings of the fences that are necessary to make the organization click, and they're the no man's land that is the particular field of a systems and procedures man. Who else is better fitted? He's the one man who travels across department lines and up and down between levels: he's seen the country, presumably he's technically competent to map it, and by order of the management, is paid to have the time and common sense to do it.

If you ever tried it, you know the impossibility of establishing a system without first having a clear definition of function, responsibility, and authority of each individual involved.

What's more, when systems and procedures are ex-

pressed in terms of services from one function to another, then about half to three quarters of the details of manuals disappear.

Mental Versus Manual Operations

Comprehension, fumbling for what to do, and referral to higher authority, are a large portion of the average clerical job. For a general estimate, 60 to 80% of time paid for in clerical work consists of these three things. You can check it for yourself. Take the day's work of one clerk. Ask him or her to re-copy it at a good pace, repeating all calculations. It's unusual if it takes more than an hour or two.

Ask yourself the question—if that took an hour, what happened to the other 7 in the day? Assume he or she is doing the best that can be done under the circumstances, and start looking for the mental operations. See if they show up in any systems or procedures that you've written up recently. Chances are, you'll have written what the person does with their hands, and said little about what they do with their heads.

You'll find that there is plenty you can do about pulling the non-routine cogitations onto qualified persons at strategic points in the routine, and in having each person's part of a job so laid out that the one who is in the best position to know what to do, is charged with complete responsibility for doing it.

It's also a fertile field for mechanization of procedure; particularly, the type represented by jigs and fixtures in the shop, permanently set-up plugboards in the office, and electronic programming of the procedures of the future.

If our management man is intelligently lazy enough to know that the hard-thinking way is the easy way, then he's frequently wide open for almost any program with a progressive sounding name and an outside chance of:

1. Buying time to work out his problems.
2. Getting some of them permanently solved.
3. Improving the operation of the business.

The obvious point here is that any program he adapts is in effect a *formalized system* for *developing systems.* This can simplify the pattern he has to deal with, and the simplification lies in concentrating many problems into one point of responsibility, and almost as much in giving the headache a name. Don't discount the value of a name! There's much to be said for primitive man's idea that naming his problem gives him control over it.

The only two basic programs that I know are scientific management and mechanization, and the one usually leads heavily into the other. In either case and both, Mr. Eisenhower again had the last word, when he stated that the principles of guiding a large enterprise are so simple that a child can understand them, but that it takes the hardest kind of work from the highest quality of staff to effect application of them to a specific problem!

Personally, I can follow scientific management principles, as laid out by Frederic W. Taylor, without necessarily getting into mechanization. But the reverse isn't true; the minute I get into a mechanization project, in simple self-defense I find myself using the full principles of scientific management plus every named technique in the books: organization planning, programming, work measurement, plan-schedule-dispatch, training, written procedures, graphic presentations, picture language, forms, tools, jigs & fixtures, job descriptions, estimate vs. actual, and any other needed.

Positive Control

Point is, the machine can't fumble through in spite of my mis-direction of it, and positive means have to be taken to lay it out and control it. In fact, one mechanized system has all the functions of a complete manufacturing plant inherent in it, though the operators never heard of those functions by name.

Mechanization is an example of one form of simplicity of pattern that management wants. It's just one word, and its progress and results are easy to measure. And it drags utilization of scientific management principles into the everyday jobs of people who would simply draw blanks if confronted with the usual management generalities.

Fantastic complications can lie behind the simple thoughts and patterns that compose our economy. "*Mechanize it.*" And we're off! Who's to prove the charge of over-simplification, when we've results to show for it? The same tendency is beginning to swing into action in regard to "*Electronize it.*" If it follows previous patterns, we'll first find ourselves committed to electronize, and then, slightly beat up but proud of it, find that we've done it.

Remember punched cards: "To get figures, just run the cards?" The appeal of such a simple thing as a push-button clerical operation is strong, and let him who recommends it look out. He's heading dead into a suppressed desire of most managements, and it's only too likely that he'll be given the job and told to produce or else.

Some things cast their shadows before, and like Dan'l Boone, if we can't "lick 'em, jine 'em!" These are some of the things we might as well get started on now; and they all stem from bigness, of business and government:

1. Human, workable systems, with decision and control points as close to the operations controlled as possible. Bigness of organization is a future must, but our problem is to keep it from faltering of its own weight.
2. Better communication of concept and ideas. Verbal transmission supplemented by personal contact works well, but separated by level and function and distance, it isn't enough. I believe our best bet

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A Consultant Looks at Methods Work

by Ron Moore

A CONSULTANT enjoys a panoramic view of the field of systems analysis as practiced in many companies. The writer sees some encouraging developments in work measurement and incentives in office operations.

OUR WORK in the field of methods work has given us an opportunity to observe a number of methods men in action. We have seen methods departments that vary all the way in effectiveness from a veritable bottleneck for forms on their way to be reprinted to a potent weapon in the battle against inefficiency and waste.

Where a methods department does not function too effectively there is usually one of two things at fault. Occasionally there is both. Either the department is hamstrung by having to report to the wrong type of person or the methods men are not getting their ideas across to the people who have to make them work.

Now I realize that there is an age-old controversy still raging as to where the methods department should be placed in the organizational structure of a company. It seems to me that the status of the department while important, is not as important as the type of individual to whom the department reports. He will usually be high enough up in the organization that if he is methods conscious he will be able to give the methods man the support he needs to do an effective job. If he is not aware of the potential savings to be realized from the proper application of methods work, then the methods department might as well resign itself to being little more than a choreboy for the executive concerned.

Suppose we illustrate this by considering the setup that we come across most frequently where the methods department reports to the comptroller. If the comptroller believes that his division's proper function is essentially one of providing services to the other divisions then there is no reason that a methods department cannot function just as effectively from this spot as any other. As part of the service rendered to other divisions the methods department would be free to survey the routines of the company on a systematic basis, department by department. If, on the other hand, the comptroller feels that his department is an end unto itself then there is a strong pos-

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sibility that the methods man may never get beyond the confines of the finance division.

While this creates a problem there is no doubt that a methods department that can prove its usefulness will be very much in demand by department heads throughout the whole company. In this manner it can usually throw off the shackles that might otherwise drastically reduce its effectiveness. This brings us then to the second reason why methods departments sometimes do not contribute as much as they might. It is a well known fact that no matter how good the system that you wish to install, unless you can convince the people who have to make it work that it really will work, you are fighting a losing battle. The difference between a system operated by a person who is convinced that it will work and who will do everything in his power to prove that he is right, and a system operated by a person who doesn't believe it will work and doess't care, is marked indeed.

Problem's the Same

We have exactly the same problem in the consulting field. We run into just as much resistance to change as you do. Thus the techniques for overcoming this resistance should be the same for both groups. There is no doubt that we have to be salesmen as well as technicians. In many cases selling an idea is a much harder job than thinking it up in the first place.

I would, however, stress only one technique that I feel is of primary importance to anyone in our kind of work. Whether you are developing only one procedure or a whole new system put yourself in the other fellow's shoes. If you can plant the germ of your idea in his mind and let him nurture it until it suddenly blossoms forth as his idea, the battle is won. This isn't always possible, however, and when such is the case it is up to you to show the supervisor, clerk or whoever you are trying to sell your ideas to, how the change is going to benefit him. It's all very well to show him how it is going to benefit the company in the long run, but human nature being what it is, a small improvement in his job or workload will carry many times the weight of a much larger improvement somewhere else.

It seems to me that we can draw a fairly valid and valuable comparison between the methods department in the office and the industrial engineering department in the plant. Both are concerned with the best method of performing an operation, the elimination of unnecessary work through work simplification, the determination of the most efficient plant or office layout, etc. Let us then compare the progress of the two departments. At once it is obvious that in almost every case the plant has far outstripped the office.

This difference in rates of progress is attributable primarily to two factors. Scientific management as applied to production got a big head start at the turn of the century and up until the Second World War had kept this lead because of the feeling still prevalent in management circles that the plant is a much more fertile field for cost reduction and methods improvements than the office. This was probably quite true a number of years ago but the picture is certainly changing. I am sure that most of you are familiar with the statistics taken from the U. S. Bureau of Labor which show that in 1900 only one worker out of every 160 was in clerical occupation, whereas in 1950 one out of every 8 was classified as a clerical worker. This increasing emphasis on clerical work has given a tremendous impetus to methods work in the office. It has also resulted in a de-emphasis in consulting firms on management problems in the plant and a greater stress being laid on office procedures, office machines, job evaluation for salaried workers, etc.

The second factor which gave industrial engineering its big lead was its ability to set standards for production operations, which could be used for such management aids as incentive plans, cost systems and production planning programs. This is still the situation in most companies today. Thus, in my opinion, the methods department will never achieve its rightful place in the scheme of things until methods men can apply this extremely important management tool to office work.

Timestudy techniques have not been applied to the office until comparatively recently for a number of reasons. One of the most important of these has been, as stated previously, that the potential savings in the office have been considered insignificant compared to the plant. Another major difficulty has been that the techniques of work measurement used in the plant have not been considered entirely suitable for the office. This viewpoint was exemplified by one of the speakers at the recent AMA conference in New York when he stated that "use of a stopwatch (in the office) . . . would not be compatible with our philosophy of management."

Savings Really Big

I feel that both these difficulties have now been largely overcome. As evidenced by the statistics quoted previously and as borne out by your own observations the potential savings through increased efficiency and production in the office can no longer be considered insignificant. This is especially true when you consider the possible savings in financial institutions such as banks and insurance companies that were at one time considered completely out of range of these techniques.

The second objection, concerning the use of the stopwatch in the office, has been met by the development of a new method of measuring work known as synthetic or predetermined motion times. This technique goes under various names such as Work Factor, MTM and the system developed by ourselves known as BMT, which stands for Basic Motion Timestudy. The basic principles of all these

systems are essentially similar although naturally each one likes to feel that it has certain features or refinements that the others lack. In any case the one feature that is certainly common to all these systems is the fact that the use of the stopwatch is largely eliminated. This is accomplished by breaking the operation to be studied down into its basic motions and then assigning times to these motions from tables that have been developed through extensive research and thoroughly checked by stopwatch studies.

Our company is spending a considerable amount of time exploring this field and I thought you might be interested in hearing a little bit about the work that we are doing and one or two of the problems that we have encountered—especially in view of the fact that this field, I feel certain, is one in which you are going to be spending more and more of your time in the future.

Our experience in office work, which I am sure has been borne out by your own observations, has shown us that there is a very great scope for increased productivity in most offices if we can only find some means of motivating office personnel to work not faster, nor longer, but more steadily. It might surprise you to know that in some of the larger offices that we have studied, many of the clerks were working at only 50 to 60 percent of what would be considered as standard output in the factory. However, this was not due in the majority of cases of lack of ability or sheer laziness. It was due primarily to the fact that most of the clerks spent too small a percentage of their working day actually on the job for which they were being paid. In some cases this may have been due to poor work scheduling, but frequently it was caused by a tendency for the clerical staff to spend a great deal of time on personal matters whether on the phone or just in idle chatter. This could perhaps be blamed on poor supervision but until a supervisor has some idea of what each clerk should produce and what he actually is producing, he will be severely handicapped in dealing with this type of problem.

Not New

Attempts to measure work in the office are by no means new. Most of them, however, have been based on past experience or records without taking into account changing conditions on the job or the working pace of the employees themselves. They have still served a purpose though by furnishing the supervisor with a means of distinguishing between good and poor workers. If the standards can be made reasonably accurate there are a large number of uses to which they can be put in the office. They include the scheduling of work, the anticipation of staff requirements for new branches or departments or for peak seasons, setting departmental budgets, evaluation of proposed methods changes, checking on the effectiveness of supervisors and last but certainly not least, the setting up of some form of incentive plan, monetary or otherwise, to increase production.

We are confident that we have developed a practical method of setting standards for highly repetitive office work such as machine operations, filing, sorting, checking, etc. without involving a lengthy and expensive series of stopwatch studies. The systems that I mentioned before, such as BMT, which set standards from tables of predetermined times, are particularly applicable to office work. The analysis of the job that forms the first step in using BMT breaks the motion needed to perform the job down into much finer detail than would be the case in a stopwatch study of the same job. This is a valuable aid in comparing alternative ways of doing the same operation and also in detecting waste motions. The length of time needed to observe and time the worker when using a stopwatch to set the standard for a job is greatly reduced by the use of BMT. Instead of the large number of studies required in stopwatch timestudy to ensure that the averages are reasonably accurate, it is necessary to observe only a few cycles of the operation to ensure that the basic motions of the job have been correctly defined. Then, the remainder of the work including assigning the times to the basic motions and calculating the standard can be performed in the timestudy man's own office. Thus, the period during which the worker is under observation, the part to which most workers object, is greatly reduced.

Another Advantage

Another advantage to this new type of timestudy is the fact that it is not necessary to estimate the working pace of the employee whose job is being studied. As anyone knows who has used conventional timestudy methods, rating the worker, i. e. estimating how far above or below a standard pace he is working, is one of the more difficult parts of the job. This has all been eliminated under the new method since the times assigned from the tables are all in terms of standard minutes. Thus within practical limits it does not matter how fast or how slow an employee performs a motion, when his job is being studied, since it is only the motion that we are interested in and not the length of time that he takes to perform it. This latter speed will come to light when his actual performance is compared to the standard for the job.

In case I have created the false impression in any of your minds that BMT was developed solely for use in the office, let me correct that impression. It and the other systems like it were developed for use in the factory where the same advantages over stopwatch methods that I have just outlined hold equally true. It just so happens that in addition to these advantages BMT also eliminates some of the stigma formerly attached to stopwatch timestudy in the office. Also in case I have painted too rosy a picture of this new technique, let me add a word of caution. There are many jobs in the office that do not

lend themselves to timestudy by BMT or any other method. We still have a lot of work to do—for example, in determining how far this approach can be used in measuring jobs that involve a considerable amount of mental effort. Care must be taken in attempting to apply an incentive plan to workers whose primary function is a checking one. There may be a tendency for the work to become slipshod or in some cases for the employee to skip part of the laid down routine and normally there is very little further check on this type of work.

Measure Actual Output

After the standards for a job have been set, some means of measuring the actual output of the employee on the job must be found. Certain types of work lend themselves very readily to this task. Some office machines already have or can have counters installed on them. Prenumbered forms such as invoices, checks, purchase orders, etc. can be counted in most cases merely by noting the starting and finishing number. Shop orders, labels, and other forms that are a uniform size can be weighed to determine the number. Some types of material such as punched or keysort cards can be measured to give a fairly accurate approximation of the number. There are various other methods of measuring output but in a great many cases the method will have to be tailored to the requirements of the job.

Perhaps one of the toughest problems that we are going to have to deal with is the question of motivation. Once we have set what we consider a fair standard for a job, how are we going to motivate the clerical worker to reach or pass that standard. In times like the present when good office staff are not too easily found, we have to be careful about telling an employee that he is going to have to increase his output without any increase in remuneration. It is essential that the employee be convinced that the standards are fair and can be attained with a reasonable amount of effort.

On the other hand suppose we attempt to set up a straight bonus plan along the lines of those in effect in a number of plants today, wherein each worker is rewarded more or less in direct proportion to the work that he turns out. I think you will agree that this type of compensation is quite foreign to the policy in effect in most offices today and a rather drastic change of heart will be necessary before this means of motivation can gain the acceptance that such plans have achieved in the factory. For the time being then this must be looked on in most cases only as a thought for the future.

Another possibility is the group bonus scheme wherein each member of a group receives a bonus dependent on the productivity of the group as a whole. Experience in the factory has indicated, however, that this type of incentive does not normally achieve its desired objective. Workers will not as a rule take it upon themselves to discipline the member of a group who is dragging their average down. In any case most workers have sufficient pride that they like to stand on their own record rather than the record of a group of which they are only one.

There are various forms of non-monetary motivation but it is still a generally accepted fact that the prospect of increased compensation is the best inducement to increased productivity on the part of most workers. It may be possible to increase production by posting the efficiency percentages of a group of workers on a bulletin board. Some employees may have sufficient pride that once they know what they should be accomplishing they will make every effort to reach that goal. However, if it becomes evident to the conscientious worker that he is working his heart out for no more pay or no more recognition than his fellow workers, there may be a tendency to slow down to the pace of the group. We cannot always reward these harder workers with promotion either, since it is a well known fact that the best workers do not necessarily make the best supervisors.

In spite of the statements I have made to the effect that monetary incentives are the key to increased production, there are quite a few cases on record of firms who have achieved a fair amount of success in using standards without monetary incentives. Some use their standards to show a supervisor what his staff should produce and then place the responsibility for meeting that target squarely on the shoulders of the supervisor. Others use the efficiency ratio, obtained by comparing actual output with the standard for the job, as a means of rating the quantity or production factor in their merit rating systems. Still others have raised the salary levels in the office and then required the office workers to maintain the standard for their jobs in order to remain in the employ of the company. Thus it seems to me that there can be no pat answer to this question of motivation. As in the case of most management aids the tool will have to be shaped to fit the requirements of each application.

Incentives Compromise

I think that one of the most interesting compromises that I have seen so far on this question of monetary versus non-monetary incentives is set out in the *Office Executive* of September, 1953 in an article entitled "Montgomery Ward's Incentive Plan." There were two points about their incentive system that particularly interested me. First was the fact that all employees are on the plan whether their jobs have been measured or not. Secondly, an employee can be downgraded as well as upgraded and his salary reduced if his production falls off and he cannot bring it back up again within a three-month period. The salary range for every job is divided into five steps and the individual employee's position within that range is determined by a semi-annual review

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A Fifth Annual Systems Meeting Paper

An expert marks the points of friction between methods staff and management and makes some worthwhile suggestions for the effective co-operation between the two agencies.

Setting Up a Systems Department

by Bruce Smyth

IN ORDER to obtain a number of points which I felt would be of importance to one setting up a systems department and which hasn't been too well covered elsewhere, I did what you would probably do. I considered the systems staffs and systems people whose situations I have known and whose problems I have been familiar with—the things that they have done which have worked well, and those which they and I have done that have not worked too well. I have attempted to draw certain common patterns which might be used as a guide, so that you may avoid our mistakes and make other mistakes more suited to your peculiar talents. Here we are on controversial grounds, for staff practices vary quite widely, even successful ones. There is no authority, so I ask that you very critically examine what I have to say. Let these ideas stand on their own feet. Percentage wise, you and I know that several of them must be wrong.

Point number one. If you listen to systems people long enough—attend their group meetings—you will be impressed with the amount of discussion devoted to the problem of selling management, with a capital M, on the idea of a central systems department. Of all of the complaints I have ever heard from my colleagues, this is far and away the most common.

Now I speak here, not of the ordinary sales effort which any of us have to make in our daily work, but rather of the problem involving the belligerently skeptical hyper-critical type of management and the environment it usually brings with it. Often these problems can be handled with good sense, patience and an effective sales effort.

There are many systems departments of which I have knowledge which aren't going anywhere. They cannot. They haven't possession of the beings necessary to solve their problems. There are two basic reasons for this. One is the tendency of systems people to put up with trouble. Our business is trouble. We accept it as a matter of course. We accept it to the point where we get so we can't identify the threshold where the odds become unreasonable and I can't believe that today's pressures which surround a large systems job would be there, were it not for our tendency to stay in the game too long with a bad hand.

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The other reason for this situation is that we are often denied the opportunity to make a decision. Most systems staffs just grow up and all of a sudden we find that they're in being, without anyone having said, "Do we want this thing around anyway?" Is the environment conducive to good systems work? The opportunity to make this decision, the opportunity to answer the question as to whether or not you want to play the hand, is the basic advantage of one who sets up a systems department. It's the first question I would ask. I think it's the most important question I would ask. I would try to answer it as honestly as I could and I think it would eliminate a lot of stuff that's going on.

Point number two, I would insist that the company actively consider the relative advantages and disadvantages of handling systems work by means of their line staff, equipment companies, outside consultants, auditors, etc.

Choose a Combination

A systems department is no fantasia. There is no reason to suppose that a systems department is going to give you what you want, in all instances. We can skip the details here. You know the advantages and so on, of a simple systems department, but I would insist that the management consciously, openly, really decide which of these methods will do the kind of job it wants, or which combination will best fulfill its needs. Then I would obtain from management a real understanding of what it's getting into, what it is going to cost them, what my policies would be and what's going to be expected of management. And here you run into a road block where management has a tendency to agree with a lot of people.

Now the boss, the top boss, has driven through the country. He has seen a few farmers producing an enormous amount of food stuff. He has gone through his factory. He has seen the worker with this big machine turning out an almost unbelievable amount of economical goods. Then he comes into the overhead section of his team and he sees all this lard and he may be tempted to paraphrase Mr. Churchill and say that, "Never have so many been supported by so few." Someday somebody is going to lower the boom, I'm afraid. Then we are all going to have to go back to work, but for the present, management, I believe, knows that a lot of staff personnel, including ourselves, are not too competent. We are pitchmen to a certain extent.

Management has a lot of scars bearing bitter testimony to the experience it has had. If you need any proof of the basic tolerance and broadmindedness of American industry, just think of all of the malarky which we staff people have poured over it in the last ten or fifteen years and then think that they will even still talk to us any more. In setting up this staff, I would be mindful of management's tendency to try the thing out and then abandon it if it doesn't work. I'd try to get a real understanding of what they are up against before we start it.

Another important point I would sell before I started, is the nature of the policies which this staff is going to follow—policies which I believe are necessary to its success. One point of policy you will run into immediately, is the extent to which you will encourage participation by line people and other segments of management in your systems work. I do not want to extend this thing too long. You know the advantages of that. There are some disadvantages. If you collaborate too closely with them of course, you adopt their predilections and that's what management tried to get away from when they hired you. If you pass too much of it along to them, then you are abandoning management's objective of getting someone in who had time enough to do the work. Also there is a certain situation you can get into when the department head participates with you, in solving the solution and becomes identified with his solution. Then you have a sales problem that's even worse than if you had let it alone to begin with.

Another point of policy, staff policy, and here I get back off the party line, I am not in agreement with the majority, is the extent to which a systems department must formally demonstrate its usefulness regarding reduced operating costs. It's not my intention here to challenge the proposition that a systems department must pay its own way. Any function in an organization must demonstrate its usefulness or be discarded. The question here is the extent to which the systems staff should demonstrate its usefulness, by means of cost reports, etc. and so forth, written into the corporate record in such a manner as to give credit to the systems staff when the improvement is made. The difficulty here centers around the fact, that many of the improvements and economies instituted by a procedures staff, can't be accurately costed for this reason. At the end of a systems installation, it is most difficult to determine which changes the systems staff has been responsible for and which changes the line supervisors and other personnel have been responsible for and what changes might have been made sooner or later, even if the systems staff had not been in the picture.

Claim and Counter-Claim

The result is usually a series of unsupported claims by the systems department and a series of equally unsupported counter claims on the part of the management or supervisory personnel. The systems department inevitably ends up in competition with line supervision, each striving to outreach or outshout the other. Each joining in a general scramble to claim credit for various portions of what is essentially a cooperative venture. Under those conditions systems work just isn't possible.

A systems staff under pressure to demonstrate its economic usefulness, will be inclined to give greatest

priority to those projects containing elements of substantial potential savings, which can be identified without too much argument. As a result, the systems program will be predicated entirely upon a cost basis and such important consideration to a more integrated organization, eternal control, customer relationships will be entirely ignored. Now there are many good systems men—good men—who contend that the only basis for systems work lies in cost reduction. There are also many who will defend the idea of requiring a staff to formally demonstrate its value, solely in terms of economies affected in accounting routines. However, it's my belief that the disadvantages to such an approach, clearly outweigh any advantages you can squeeze out of the thing.

The results of an intelligently administered systems staff are usually so clearly profitable that an overall measurement of results taking all factors into consideration and handled in a confidential manner, so as to avoid embarrassment to line management, should suffice. All formal credit for improvements should go to the departments involved. Let them wear the sword. They love it.

Another point of staff policy I would try to clear up—and this isn't so easy and I don't think it's so vital either—is the source of assignments. The extent to which you should aggressively seek out engagements and the extent to which you should encourage work to be brought up voluntarily by various members of management. Your decision in this instance will of course depend largely upon the general environment in which you work. There are many instances in which only aggressive action on your part, can accomplish the objectives management had in mind, when they brought you into the picture. On the other hand, I believe that inadequate consideration has been given to the desirable independence, which a staff has in those instances where a department head has come to it and has initiated the request for a procedure survey or installation. A man who may have to make some very unpleasant recommendations is in a much better position, if he has been asked to do so first. If he has sought out the engagement, his relationships with the subject will be on an entirely different basis.

Research Costly

Another point of staff policy I would try to clear up before I started would be that of research. Research costs money today, an awful lot of money. Any of you who have costed the staff effort you have to devote to just such things as one line, say a new line of I.B.M., will be impressed with the terrific cost of the thing. But it's a cost that's going to have to be borne, if you are going to stay in business.

There are a number of other considerations relative to staff policy, but I think these cover the more important subjects and certainly give you an indication of what you would clear up before you teed off.

Now you have before you, spread around there a number of sheets that have simply been borrowed from a number of sources, and they are a very rough proposition, but then we have a very rough subject here. You are all acquainted with the normal type of organization. This thing, the deal, looks like a pyramid, with the boss at the top, slanting out to a great mass of workers at the bottom. This is rather a normal type of organization. If this type of arrangement is attempted in a systems staff—that is a supervisor or manager, supervisors, seniors, assistants, etc.—several difficulties will be encountered, as such an organization implies a delegation of duties and authorities down through several levels, which is not practicable in systems work. Because of their small size many assignments are strictly one-man affairs and splitting them into parts, which could be spread over several levels of organization would be impractical. In larger projects most of the questions encountered require a knowledge of the entire picture to their solution and as a result it is usually necessary to centralize decisions in one individual.

Senior Is Dominant

As a result, seniors form the bulk of most staffs. The senior controls every phase of the assignment and the others operate strictly in a "legwork" capacity, being assigned from senior to senior as needed. You can call this the inverted type, I suppose, of organization, because the largest segment is at the top rather than at the bottom.

Let's look at this thing you have on the lower portion of the first page here. In such an organization there is very little flow of work through any regular pre-determined constant set of channels. Individual staff members are moved about with maximum flexibility, the group changes form to adapt itself to each problem as it arises. The lines of authority which you don't see there, lines of authority and control are reset for each assignment. Several setups may exist at one time, if several projects are being handled simultaneously. You can overlay one on the other. In a staff of this nature, of course you are going to run into questions to the extent to which you are going to allow your people to specialize. Generally speaking, I am against it. It destroys the flexibility that you want on your staff. It cuts an individual's ability to see the entire picture and it limits his personal growth.

The main exceptions on large staffs of which I have knowledge, of course is I.B.M. Most of us have one or more I.B.M. so called experts. I don't see how we can escape specialization in the case of the electronic applications. Maybe we can compromise. There are quite a few successful compromises around the country. Staffs in which seniors will handle everything, but each one has a sort of a part time specialty which he can use in case of emergency.

As to the selection of personnel, I don't want to even

touch the subject except very briefly, because I'll fall into it and I'll never get out. I would like to bring up one point and here again I am issuing a minority report. I haven't too much support among some of my colleagues. We need creative imagination. That is the big shortage on any staff today and we aren't getting it. The person with the time and the money for an education isn't going into the business field the way he used to. He is going into medicine, our sciences, the arts, maybe law, teaching, at any rate we're not getting him. I think that too many of us feel, that we are competing with the controller's staff for our people. We're not. We're competing with the laboratories, the foundations, the schools, the professions, the places where the creative imagination we need is now located. And furthermore, that competition took place ten years ago, when the fellow out there in the lab decided to go in for chemistry rather than business administration.

Something's Wrong

When I think of the number of people who have taken obscure posts with low incomes so they may have intellectual freedom and a sense of accomplishment, and when I think of how badly we need these people—I know that something, somewhere in our personnel procurement smells. Something is wrong.

Now I know that we have to sell our systems, I know that we have to get along with management, I know that we have to live in our environment, but the things we have to do to sell our systems, the things we have to do to get along with management, the things we have to do to live in our environment, are not things which set well with the type of personality that usually accompanies a creative mind. We have an engineering, a brainwork problem and we are trying to insist that our people work in an environment designed for clerks. The thing that those people resent, especially the young men, is the continual necessity for the accommodation of what they do to the reactions of someone in a higher level of authority and I think a very real personnel problem, staff-wise, is that of reconciling the necessities of our work, what we have to do with these people. We have got to get them or we are going out of business.

I think that systems staffs are, generally speaking, very poorly prepared in three respects—that is, their mechanical equipment, their space and their forms. Because we are so busy preaching to everyone else, we haven't got time to clean up the mess at home. But I have here a tabulation of the equipment now in use by a 15-man staff. There is nothing of too much interest to you, I believe, except this. You have six seniors here and that's all you've got to peddle. Now your chances of going out and getting any more are rather slim, on a competitive basis. The only thing you can do is to improve their production.

I was called recently by a systems staff in Chicago that was considering installing some Haloid equipment. They were worried about that nine hundred down there on the bottom of the page. That seemed to stick them. Now that staff, so help me, was bigger than the one you see here. They were spending close to $150,000 a year on their men, and the $900 a year bill, which was a very small percentage of what was being spent on liquor in that company, seemed to stop them. I know that situation to arise again and again. The only way to handle this problem, the only way to justify your existence, is to soup this thing up with equipment. We have had a great result for instance, in combining Haloid equipment with a contact printer. We use a Bruning. We have cut certain staff operations—the pick and shovel end of it—down tremendously. I don't think that sitting around hollering we can't get the people is the only answer to some of our production problems.

We ought to give people an environment in which they can work. Give your senior man an office where he can close the door. Route his phone through a call box or a key cabinet and tell the girls to take his calls, so that if he has to, he can get some out for you. I don"t know how you're fixed, but I have seen so many staffs, where they put all the boys in a bull pen and wonder why they act as though they are in a constant pinochle game and you can't blame them.

I would make certain that management understood these points before I started. I would try to explain that this is an expensive proposition, that if they're willing to spend forty thousand a year and have me deliver something, I don't think I want the thing, because I think it's a bad bet, but if they are willing to spend $130,000—in this instance let's say $140,000—I think I can give them a very handsome return on their money.

Wanted: Simple Records

A simple records setup for a systems department seems hard to come by. I don't know of four systems staffs in the United States, and I know most of the large ones, which have a record set up that's worth a hoot. They all deal off the tops of their heads and it's a wonder that they do as well as they do.

Let's not look at this layout of records especially at the moment. There is an assignment routine there you can check up later. Whatever you do, put your assignments down on a piece of paper. Tell everybody else to do it, just try it for awhile, it's not a bad idea.

Don't try to run a staff by ear. You may think you know how much effort you are spending on things, but you really don't know. I have tried it both ways. I have tried both sides of the street. I am just as good a guesser as most, and a better liar. But you can't handle this thing unless you have the facts. **s/p/a**

Management Wants

(*Continued from Page 16*)

is to work toward maintaining personal contact through voice and television communication. Simultaneously, we can work toward equipping subordinates to think and act better for themselves. It's possible that use of a still camera to supplement written communication may help. It works well in job descriptions now.

3. Electronization of routine administrative work. There's an excellent chance of using it to replace the whole bottom level of our present administrative structure, and if that's done, then we've removed ¾ of the bodies involved, and at least half the confusion.

The time to start on these things is *now*, if you haven't already done so. They have this in common—work done *now*, for the *future*, will pay off *now* in improvements *now*. Apply as much of your research as you can; and if you combine it with a genuine conviction that repetitive routines are for mules and machines, you'll find yourself leading the parade of the present. **s/p/a**

A Look at Methods Work

(*Continued from Page 20*)

of his production or his performance depending on whether or not a standard has been set for his job.

Montgomery Ward have not attempted to measure all jobs but those that are not measured are reviewed in detail and appraised on the basis of the employee's performance on each of the duties that make up his job. In the case of employees on measured work, the standard is set so that the average worker can produce at 125% of standard. Five levels of efficiency have been established to correspond to the five steps in the salary range. Thus, if an employee's productivity falls within a range of 94% to 106% his salary will be in the bottom step, if it is between 107% and 118% it will be in the second step and so on until if it is above 144% it will be in the fifth or top step. It is very important to remember in this connection that the hiring rate or first step at Montgomery Ward is not the hiring rate for other firms. It is the going rate for the job and this is the amount paid for roughly 100% productivity.

In conclusion let me state that I personally feel that there is a great future and an ever-widening horizon opening up for those in the methods field. This will come about not only as a result of the increasingly important role that the office worker is assuming in our national economy but also as a result of new developments in the field such as the one I described to you a moment ago.

I also feel that there is unlimited scope for consultants and methods men to work together through exchanges of information and ideas which will work to the mutual benefit of not only the parties concerned but also to business as a whole. **s/p/a**

Mechanization

(*Continued from Page 5*)

Profitable installation in a small company can be illustrated by this actual case.

In a distributing company having only six office employees, the installation of a bookkeeping machine capable of handling all journals and all ledgers permitted a reduction to five employees. The machine paid for itself in less than two years. It also permitted the establishment of more orderly routines in the office and ended considerable confusion that had previously existed.

If a variety of procedures is mechanized, a more versatile machine will be required. A spirit duplicator can be purchased for around a hundred dollars to do a simple duplicating job, but if the duplicator is to be used to write the variety of documents required for a production control system, a much more expensive machine is desirable. A bookkeeping machine may not be profitable in a small office if it is used only for receivables and payables and the related distributions. To make it profitable, it may be necessary to mechanize procedures for such items as salesmen's commissions, payrolls, labor distribution, job costs, departmental performances, budgets, stock records, the general ledger, financial statements and many other items. If volume appears to be too small to warrant a machine, variety may make it profitable.

One common error in the installation of a bookkeeping machine or tabulating equipment is to try to do an operation mechanically in the same manner in which it was previously done manually. That method may get the work done but usually the potential value of the machine is not realized. If the survey has been thorough, it frequently will be found that good manual procedures are not necessarily good procedures for machine use. It is usually necessary not only to examine journals, summaries, recaps and ledgers, but also to observe the source documents, the location and the manner and form in which those source documents are prepared. To obtain a good machine installation, it is not uncommon to redesign the source documents and to revamp the whole office routine so that the documents come to the machine under proper control and in the most desirable form for a fast, smooth machine operation, whether it be machine bookkeeping or card punching.

The need for revising the forms, procedures and office routines to integrate them effectively with the proposed mechanization can be illustrated by a recent actual case.

In a manufacturing company a bookkeeping machine was installed. It was necessary to redesign

the sales invoice completely. The method of extending and footing was changed. The method of establishing controls and of transmitting the invoices from one department to another was changed. Duties of the clerical staff were completely re-allocated and the type of help required was found to be quite different.

Estimate Should be Realistic

If the survey has been sufficiently thorough, if a decision has been made as to exactly what work ought to be done mechanically, if the volume of each item has been determined and if the mechanical procedures have been determined—the estimate can be prepared. It will include rental or investment in major equipment, investment in accessories, printing costs and personnel costs. The estimate should be realistic; it should contain adequate safety factors for errors in volume, for unexpected lost time and for undisclosed requirements that may make necessary a more involved operation than that which was originally contemplated. The personnel needed must be stated in whole clerks. Mechanical installations almost always require a considerable re-allocation of work for it is impossible to lay off one-half of a clerk. Obviously, the other half of that clerk would quit. If the estimate shows a need for one-half of a clerk, a whole clerk must be paid for, or the work must be re-allocated to other clerks who can absorb it. The re-allocation of work made necessary by a machine installation sometimes is a study in itself but it must be done if the estimate is to be realistic. Savings stated in terms of percentages or in terms of hours saved here and there are meaningless unless it can be demonstrated that they can be realized in the clerical payroll. **s/p/a**

Memorandum

(*Continued from Page 12*)

considered desirable to set up one report in one format, and then attempt to switch format in the middle of a series of related records, and particularly not on alternate issues. Confusion in appearance, as well as in filing size and in printed forms, cuts down readability and convenience of comprehension to an undesirable degree. The result has been that our 402 machine, with limited symbols, unwanted width of forms, and limited columnar distribution, is only rarely interchangeable with the 407, and is gradually being limited to production of work sheets only, in spite of the fact that we have 30 panel fixtures for this one machine and that machine usage is distinctly lower than the average of the three 407 machines.

8. Over-all Requirements—1954:

At present, we are evaluating our 1954 requirement of control panel fixtures for all machines. Following is our approximate inventory:

Fixtures	Machine No. & Description	No. per Machine & Type
40	407 Report Tabulator	14 - quadruple panel
30	402 Work Sheet Tabulator	30 - triple panel
75	(519 Reproducer [Doc. Wrtr.] 521 Computer Output Unit)	15 - double panel
40	(077 Collator 552 Interpreter)	7 - single panel
35	604 Computer	17 - single panel

Studies of over 200 separate jobs, involving over 1,000 separate operations, are necessary to ascertain how many fixtures of each type are economically justified by present work. From these figures, we can estimate how many will be required by specific committments and probable new requirements in 1954.

We intend to submit this as a budget requirement for 1954, along with what we expect to gain in machine and manpower savings, and we sincerely hope that this procedure will avoid both the scramble of getting approvals on partial requests, and the high cost of operating with inadequate tooling. **s/p/a**

Inventory Management

(*Continued from Page 10*)

sales volume with greatly reduced stock.

2) Permits the daily preparation of reports on stock shortages and overstock.
3) Improves customer service by providing a more representative stock, and showing the visual balance of every stock item, thus reducing back-orders and speeding up order handling.
4) Controls the rate of turnover of each stock item, so that the costs of stock acquisition, purchasing etc., and possession, storage, handling, insurance, etc. are as low as possible, thus creating a maximum profit.
5) Relieves, if not eliminates, the problem of congested warehouses and stockrooms.
6) Produces a better net return on monies invested on inventories.
7) Reduces, if not eliminates, the need to borrow large sums of money for extended periods, thus saving interest charges, on such borrowings and unnecessarily extending your bank financial position.

The United States has the custodianship of the greatest material resources (finished goods or otherwise) that the world has ever known, but let us not overlook our role in this custodianship. **s/p/a**

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